The following Listing of Claims replaces all prior versions and listings of claims in this application.

LISTING OF CLAIMS

1.-31. (Canceled)

32. (Previously presented) A tunable microwave/millimeter-wave arrangement comprising:

a tunable impedance surface, wherein the tunable impedance surface comprises at least one of an Electromagnetic Bandgap (EBG) structure and a Photonic Bandgap (PBG) structure, the EBG and PBG structures comprising:

at least one tunable ferroelectric layer,

at least one first, top, metal layer, and

at least one second metal layer,

wherein the first and second metal layers are disposed on opposite sides of the at least one ferroelectric layer; at least the first metal layer is patterned; a dielectric permittivity of the at least one ferroelectric layer is dependent on a DC biasing voltage applied directly or indirectly to at least one of the first and second metal layers disposed on different sides of the at least one ferroelectric layer; and at least the first metal layer is patterned such that the first metal layer comprises an array of radiators that form a two-dimensional (2D) array antenna and that are galvanically connected by via connections through the ferroelectric layer with a further second, bottom, metal layer, and a DC biasing voltage is applied to the first metal layer indirectly over the further second metal layer.

33. (Canceled)

34. (Previously presented) The arrangement of claim 32, wherein the radiators comprise resonators.

35. (Previously presented) The arrangement of claim 34, wherein the resonators comprise patch resonators.

36. (Previously presented) The arrangement of claim 35, wherein the patch resonators are circular, square, or rectangular.

37. (Canceled)

38. (Previously presented) The arrangement of claim 32, wherein the 2D array antenna comprises a reflective antenna.

39. (Canceled)

40. (Previously presented) The arrangement of claim 32, wherein the second metal layer is patterned, and includes openings that allow the via connections to pass to the further second metal layer, and the DC biasing voltage is applied between the two second metal layers to vary an impedance of the array of radiators.

41. (Previously presented) The arrangement of claim 40, wherein the via connections are connected to center points of the radiators where a microwave current is substantially highest.

42. (Previously presented) The arrangement of claim 38, wherein a radiator spacing in the first, top, metal layer is approximately $\lambda_0/30$, where λ_0 is a free-space wavelength of an incident microwave signal.

43. (Previously presented) The arrangement of claim 38, wherein varying the DC biasing voltage varies an impedance of the array of radiators from inductive to capacitive.

44. (Previously presented) The arrangement of claim 38, wherein the array of radiators comprises substantially 20 x 20 radiators, and a dielectric permittivity of the ferroelectric layer varies between approximately 225 and approximately 200 or is in a range between 50–n x 10000, where n is an integer, the ferroelectric layer having a thickness of about 50 micrometers.

45. (Previously presented) The arrangement of claim 32, wherein radiators are arranged in at least two two-dimensional (2D) arrays, comprising the first and second metal layers between which the ferroelectric layer is disposed, and the arrays comprise a transmission antenna.

46. (Previously presented) The arrangement of claim 45, wherein dielectric or ferroelectric layers are provided on sides of the first and second metal layers and are not in contact with the ferroelectric layer.

47. (Previously presented) The arrangement of claim 45, wherein a DC voltage is applied to the metal layers and is provided to each individual radiator for changing a dielectric permittivity of the ferroelectric layer.

48. (Previously presented) The arrangement of claim 47, wherein the arrangement comprises a wavefront phase modulator for changing a phase of a transmitted microwave signal.

49. (Previously presented) The arrangement of claim 45, wherein the DC biasing voltage applied to each radiator is controllable via an impedance device.

50. (Previously presented) The arrangement of claim 49, wherein the arrangement comprises a beam scanning antenna.

51. (Previously presented) The arrangement of claim 49, wherein separate DC voltage dividers are connected to the radiators, one in an x-direction for radiators of one metal plane and one in a y-direction for radiators of another metal plane, thereby enabling non-uniform voltage distribution in the x- and y-directions and tunable, non-uniform modulation of a microwave signal phase front.

52. (Previously presented) The arrangement of claim 51, wherein the impedance devices comprise resistors.

53. (Previously presented) The arrangement of claim 51, wherein the impedance devices comprise capacitors.

54. (Previously presented) The arrangement of claim 52, wherein each radiator is individually connected to the DC biasing voltage over a separate resistor.

55. (Previously presented) The arrangement of claim 45, wherein a thickness of the ferroelectric layer is between about 1 micrometer and several millimeters, and the DC biasing voltage ranges from 0 volts to several thousand volts.

56. (Currently amended) A tunable microwave/millimeter-wave arrangement comprising:

a tunable impedance surface, wherein the tunable impedance surface comprises at least one of an Electromagnetic Bandgap (EBG) structure and a Photonic Bandgap (PBG) structure, the EBG and PBG structures comprising:

at least one tunable ferroelectric layer,

at least one first, top, metal layer, and

at least one second metal layer,

wherein the first and second metal layers are disposed on opposite sides of the at least one ferroelectric layer; at least **[[the]]** <u>one</u> first metal layer **[[is]]** <u>and at</u>

least one second metal layer are patterned; a dielectric permittivity of the at least one ferroelectric layer is dependent on a DC biasing voltage applied directly or indirectly to at least one of the first and second metal layers disposed on different sides of the at least one ferroelectric layer; and the first and second metal layers comprise a respective number of radiators, and the radiators of the first and the second metal layers are differently arranged.

57. (Previously presented) The arrangement of claim 56, wherein different coupling means are provided for the radiators of the first and second metal layers.

58. (Previously presented) The arrangement of claim 56, wherein a DC biasing voltage is applied to the radiators of the first and second metal layers to change a lumped capacitance and thereby a capacitive coupling between the radiators.

59. (Previously presented) The arrangement of claim 47, wherein the radiator arrays are integrated with a waveguide horn such that by changing the DC biasing voltage the horn varies a microwave signal.

60. (Previously presented) The arrangement of claim 32, wherein a spacing between adjacent radiators corresponds to a factor of about 0-1.5 times a wavelength of a microwave signal in the ferroelectric layer.

61. (Previously presented) The arrangement of claim 32, wherein the arrangement comprises a three-dimensional tunable radiator array.

62. (Previously presented) A method of controlling microwave and millimeter-wave signals, comprising the step of using an arrangement according to claim 32 for changing at least one of a phase and amplitude distribution of the signals reflected and/or transmitted through the arrangement.